



INDUSTRIAL COATINGS

ZB4200SM / ZB4200SR

ZIRCOBOND 4200SM / 4200SR

PRODUCT DATA

PRODUCT ADVANTAGES

- Designed specifically for spray systems
- Deposits high quality zirconium films at low application temperatures
- Prepares surface for optimum paint adhesion
- Specially formulated for multi metal applications
- High performance and compatibility with cationic electrocoats
- No post-rinse sealer is required

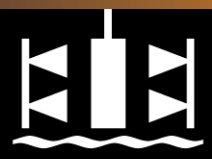
ZIRCONIUM BASED CONVERSION COATING

PRODUCT DESCRIPTION

ZIRCOBOND 4200SM is a zirconium-based conversion coating formulated to provide excellent corrosion resistance for steel, galvanized steel and aluminum substrates. The **ZIRCOBOND 4200SM / ZIRCOBOND 4200SR** system is designed to provide performance that are equivalent to zinc phosphate when protected with cationic electrocoats. **ZIRCOBOND 4200SR** is the preferred replenisher.

TECHNICAL PROPERTIES

	ZB4200SM	ZB4200SR
Composition:	Liquid	Liquid
Appearance:	Clear Light Blue	Clear Light Blue
Odor:	Slightly Acidic	Slightly Acidic
Specific Gravity:	1.01	1.02
Pound per Gallon:	8.44	8.47
Flash Point:	None	None
Foaming Tendency:	Low	Low
Recommended Diluents:	Water	Water
Behavior in Hard Water:	Excellent	Excellent
Rinsability:	Good	Good
Kg per Liter:	1.01	1.02
Recommended Concentrations:	2-3% by volume	Replenisher Only
Recommended Temperatures:	60°F - 115°F	NA
pH (concentrate):	1.4 - 1.9	1.4 - 1.9
pH (working solution)	4.4 - 5.2	NA



PRETREATMENT

JAN10/REV6

USE & CONTROL INSTRUCTIONS:

Product Operating Ranges

pH:	4.4 – 5.2
Concentration:	2.0 – 3.0 % by volume.
Temperature:	60°F – 115°F (15.5°C – 46.1°C)
Contact Time:	20 – 90 seconds
Application:	Spray

Normal Operating Parameters

pH:	4.6 – 4.8
Concentration:	2.5% by volume
Temperature:	75°F-95°F (24°C – 35°C)
Application:	30 – 60 seconds, spray

Specific process conditions may require operating the above parameters outside of the normally specified ranges. For example, short dwell times may require operating at higher chemical concentrations. Please consult your PPG representative to establish the optimum operating parameters.

Typical Process Sequence

STAGE 1 –	CHEMKLEEN, MAGNUSPRAY, or ULTRAX ALKALINE CLEANER #
STAGE 2 –	CITY WATER RINSE
STAGE 3 –	CITY WATER RINSE
STAGE 4 –	ZIRCOBOND 4200SM/4200SR
STAGE 5 –	CITY WATER RINSE
STAGE 6 –	DEIONIZED WATER

- Cleaner recommendation will be based on the metal mix, soils and application equipment.

NOTE:

Spray applications: PPG recommends a mix of flat jet and hollow cone nozzles. For example, use flat jet nozzles at the vestibule entrance and exit, hollow cone nozzles on the central risers. Spray pressures of 8-12 psig are recommended.

Immersion (Dip) Application: ZIRCOBOND 4200DM / DR are the recommended products

Process Equipment

Process equipment should be constructed of 304 or 316 stainless steel. Mild steel equipment should be lined with an appropriate corrosion resistant coating. Process piping and pumps should also be constructed of 304 or 316 stainless steel. Pump seals and gaskets should be compatible with acidic solutions, for example, Viton™ or Teflon™.

ZIRCOBOND 4200SM /4200SR

PRODUCT DATA

Charge Instructions

Fill the tank $\frac{3}{4}$ full with fresh water (deionized or RO water is recommended over hard water). For each 100 gallons (378 L) of working volume, add 2.5 gallons (9.5 L) of **ZIRCOBOND 4200SM** and then mix thoroughly. Bring the solution level close to the working level and check the pH. While mixing, add 5 fluid ounces (150 ml) of Chemfil Buffer to 100 gallons of bath. Check the pH. Slowly add additional Chemfil Buffer to bring the pH within the operating range of 4.4 – 5.2. (The target pH for most operations is 4.6 – 4.8.)

Note: The amount of CHEMFIL BUFFER necessary for pH adjustments will vary for each installation due to water quality and initial pH.

Water hardness exceeding 150 ppm (as calcium carbonate) should be replaced by deionized or reverse osmosis water.

Control of ZIRCOBOND 4200SM

The **ZIRCOBOND 4200SM** bath is controlled by pH using an automated system.

Automated control is the best way to replenish the **ZIRCOBOND 4200** bath. This method continuously maintains the optimum bath pH. When pH rises only slightly, the controller activates a pump to feed **ZIRCOBOND 4200SR** (the replenisher) into the bath. The use of a pH controller provides best method to minimize chemical consumption and to maintain uniform process conditions.

Equipment needed:

- ACCU-LOOP pH Controller
- Metering Pump (24 gal/day or 44 gal/day)

Reagents Needed:

- pH 4 buffer solution
- pH 7 buffer solution

The pH controller needs to be calibrated prior to use and periodically according to the Manufacturer's instructions. The pH of the **ZIRCOBOND 4200SM/4200SR** bath should be maintained in the desired range of 4.4-5.2, however, for optimum quality a target pH of 4.6 - 4.8 is typically desired. In general, the pH probe tip needs to be cleaned at least once per week. This can be accomplished using a tooth brush and a mild alkaline cleaner. Thoroughly rinse the probe tip with fresh water and recalibrate before reintroducing the probe into the **ZIRCOBOND 4200SM/4200SR** bath. The metering pump setting depends on the combination of square footage throughput and tank size.

Adjustments to the pH can be made as follows:

- To raise the pH approximately 0.1 units, add 11 mls of Chemfil Buffer per 100 gallons of operating solution.
- ZIRCOBOND ADDITIVE LPH** should normally be used to lower the pH. In specific circumstances **ZIRCOBOND 4200 SM/SR** can also be used to lower pH.

Contact your PPG representative to choose the appropriate product for your situation.

Iron Control

ZIRCOBOND 4200 baths are usually white and cloudy when processing steel. However, if the solution starts to turn yellow, the iron level has begun to increase beyond recommended levels. This can be confirmed by using iron test strips (e.g. from Fisher Scientific, cat# M100041). To precipitate the iron, add ZIRCOBOND ADDITIVE P. Contact your PPG representative for assistance.

Concentration Determination of ZIRCOBOND 4200SM/4200SR

The **ZIRCOBOND 4200SM/4200SR** concentration can be monitored using a colorimetric technique to measure the zirconium concentration.

Equipment:

- Hach DR890 colorimeter with sample cell (Hach cat. # 48470-00)
(Must be programmed at the Euclid technical labs prior to use)
- 25 ml Hach cell (Hach Catalog # 2401906)
- Eppendorf 500 microliter fixed volume pipette (Fisher catalog # 21-371-12)
- Eppendorf pipette tips (Fisher Catalog # 05-403-59)
- Hach Tensette pipette (Hach Catalog # 19700-10)
- Hach Tensette pipette tips (Hach Catalog #21997-96 50pk #21997-25 250pk)
- 100-ml Volumetric Flask
- Timer

Reagents

- Reagent AR Arsenazo III dye solution (Reagents Inc., Catalog # 83029-NE01)
- Reagent H - Hydrochloric Acid 50% v/v (Reagents Inc., Catalog # 5-50500-L)

Procedure:

The zirconium concentration in the **ZIRCOBOND 4200SM/4200SR** bath should be checked once or twice per shift. The minimum zirconium concentration for a properly functioning bath is 40 mg/ L (ppm).

1. The bath sample needs to be filtered and then diluted by a factor of five (5) with deionized or distilled water. Filter 20 mls of bath sample through a syringe filter (5-10 microns) and then add the 20 mls of filtered solution to a 100 ml volumetric flask. Fill to the mark with deionized or distilled water and place stopper in the opening. Shake well and set aside for step 9
2. Turn the unit on by pressing the (EXIT) button. Press PRGM, then 105, then ENTER.
3. Place 5.0 mL of Reagent AR (0.05% arsenazo III solution, part number 83029-NEO1) into the sample cell followed by the addition of 20 mL of Reagent H (6.0N HCl, part number 7-10115-1). This is the blank solution for zeroing the colorimeter.
4. Cap the sample cell and mix for about 10 seconds.
5. Wipe the outside of the sample cell with a paper towel.
6. Place the sample cell into the DR890 and cover with the cap.
7. Press the ZERO button once and the unit will automatically zero the instrument.
8. Press the TIMER button on the unit. Then press 1, 0, 0 in succession. This sets the timer for one (1) minute.

9. Add 0.5mL (use an adjustable pipette or a standard fixed volume glass pipette) of the diluted sample (from step 1) to the sample cell containing the reagents from step 3, and then start the timer by pressing ENTER. Shake the sample cell for 10 seconds. Insert the sample cell back into the unit and place the cap on top.
10. After one minute (the unit will beep three times) press READ. The number that finally appears is the concentration (ppm) of zirconium in the bath sample.

Note: There are no known interferences with this method.

CONCENTRATION DETERMINATION OF ZIRCOBOND ADDITIVE ED:

ZIRCOBOND ADDITIVE ED may need to be added periodically to the ZIRCOBOND 4200 bath.

Equipment Needed:

- DR890 Colorimeter from HACH.
- 20 ml pipette for bath
- 25 ml sample cell from HACH
- 100 ml volumetric flask
- CuVer2 Reagent from HACH. Product # 2188299 (Bicinchoninate).
Each test uses one pillow.

Measurement Procedure:

1. The bath sample needs to be diluted by a factor of five (5) with deionized or distilled water, for example, take a 20 ml sample of the bath and place it in the 100 ml volumetric flask. Add deionized or distilled to the mark (place stopper in the opening) and shake well and set aside for step 5.
2. Turn on the instrument (press the EXIT Button)
3. Press PROGRAM
4. Press 20 and then press ENTER
5. Pour 25 ml of the diluted bath sample (from step 1) into the sample cell. (DO NOT ADD THE CUVER2 at this point)
6. This is your blank. Wipe the outside of the sample cell with a paper towel. Replace the sample lid.
7. Place sample cell into holder and cover the sample cell with the instrument cap.
8. Press the ZERO button. Wait for 0 mg/L to show on the screen.
9. Press TIMER.
10. Remove the sample cell from the HACH meter and add the contents of one CuVer2 powder pillow to the sample cell and then press ENTER. Wipe the outside of the sample cell with a paper towel. Replace the sample lid and shake the sample well to mix (about 10 seconds).

11. After 2 minutes (the unit will beep three times) press READ.
12. The Concentration is displayed in mg/L which equates to ppm of ZB ADDITIVE ED.
13. Multiply this number by 5 to obtain the Additive ED concentration.

If the ZIRCOBOND ADDITIVE ED concentration is between 8 – 12 ppm, do not add any additional ZIRCOBOND ADDITIVE ED to the bath. If the ZIRCOBOND ADDITIVE ED level is less than 5 ppm, add sufficient ZIRCOBOND ADDITIVE ED to raise the level back approximately to 10 ppm. The addition of 3.0 ml of ZIRCOBOND ADDITIVE ED per 100 gallons of ZIRCOBOND bath will increase the additive level by 1 ppm.

Determination of Free Fluoride:

Free Fluoride will continually rise in the bath while processing work. The zirconium coating can be adversely affected at high levels so a target of 30-75 ppm normal operating range is desired and at all times the concentration should be less than 100 ppm.

Equipment:

Ion Selective Electrode Meter
Fluoride Electrode
2 ml certified pipette
100 ml plastic beaker
Magnetic Stirring Plate
Teflon Coated Stirring Bar

Required Reagents:

10 ppm Fluoride Standard
100 ppm Fluoride Standard
1000 ppm Fluoride Standard
10000 ppm Fluoride Standard

Procedure

Standardization

1. Using an ion selective electrode meter, select a three-point calibration if possible, using the automatic endpoint detection when available. When measuring phosphate baths, use the 100, 1000, and 10000 ppm standards. If the meter is only capable of doing two-point calibrations choose the 100 and 10000 ppm standards.
2. While stirring, place the electrode in the appropriate standard, start the reading (generally this is accomplished by pressing the CAL button), wait for automatic endpoint display indicating the completion of that standard point. Rinse the electrode with deionized water and dry. Repeat this step until all standards have been read.

Free Fluoride Measurement Procedure:

1. Place electrode in the sample bath at ambient temperature without dilution. Stir using the magnetic stirrer. Read the sample fluoride concentration.
2. To obtain the Free Fluoride divide the reading obtained in step 1 by 26.

The ZIRCOBOND ADDITIVE FC should be used to control Free Fluoride when it reaches 75-100 ppm. As the Free Fluoride increases with the fluoride coating process, ZIRCOBOND ADDITIVE FC is added to precipitate **excess** fluoride and maintain the fluoride level within the desired range. Care should be taken to meter this product in slowly to avoid precipitating zirconium in the bath. The ZIRCOBOND ADDITIVE FC should be added to the tank away from where the ZIRCOBOND 4200SR is added and into a turbulent part of the tank.

Note: If the Free Fluoride reaches 40 ppm, the feed of ZIRCOBOND ADDITIVE FC should be turned off.

Application:

ZIRCOBOND ADDITIVE FC – 0.1 gallons (378 mls) will reduce Free Fluoride in a 1000 gallon bath by 9 ppm.

Replenishment Guide

Use the following table to determine product additions based only on bath samples at 4.4 - 5.2 pH.

ZIRCOBOND 4200SM Replenishment Chart

Zirconium Concentration mg/l (at 4.0 – 5.0 pH)	Gallons of ZB4200SM to add per 100 gallon tank volume
60	0.0
50	0.5
40	1.0
30	1.5
20	2.0
10	2.5

TECHNICAL DATA SHEET DISCLAIMER—INDUSTRIAL COATINGS:

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